THE CORNELL READING COURSE FOR THE FARM

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HARNESS REPAIRING

F. G. BEHRENDS

THE CORNELL READING COURSE FOR THE FARM

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HARNESS REPAIRING

F. G. BEHRENDS

There is an old adage which says, "A stitch in time saves nine." Making a repair on a harness when the stitches first break is a stitch in time. Frequent cleaning and oiling and timely repairing combine to save time and labor and to add many years to the life of a harness.

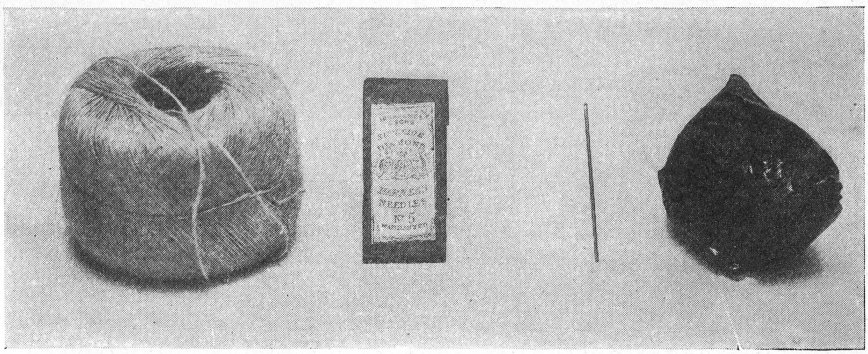
Two or three rivets and a piece of wire, while doubtless of value in cases of emergency, should be and can be replaced easily by more suitable and durable repairs. When the simple arts of making a waxed thread and of stitching have been mastered, anyone can, with the aid of a few special repair parts, easily care for and repair a harness.

It is the purpose of this lesson to explain these simple operations and to bring to the farmer's attention the ease and simplicity of making many of the common repairs. The time spent in cleaning, oiling, and repairing a harness is time well spent.

When time permits, during the winter or on rainy days, the harness may be gone over and parts where the stitches have given away stitched, or riveted splices or other parts temporarily repaired can be put in final shape by stitching. The stitching is done with a harness thread which must be prepared. Such a thread is made of several strands of linen thread well twisted together and waxed. A needle or a bristle is attached to each end. Such a thread can easily be made at home, and, if carefully made, the stitching can be quickly done and the repairs will be strong and lasting.

MAKING A WAXED HARNESS THREAD

The making of a waxed harness thread is not a difficult operation as the arts of measuring, tearing, twisting, and waxing the thread may be



A B C

FIG. 16. MATERIALS USED TO MAKE A HARNESS THREAD

A, Ball of No. 10 linen thread; B, needles; C, shoemakers' wax

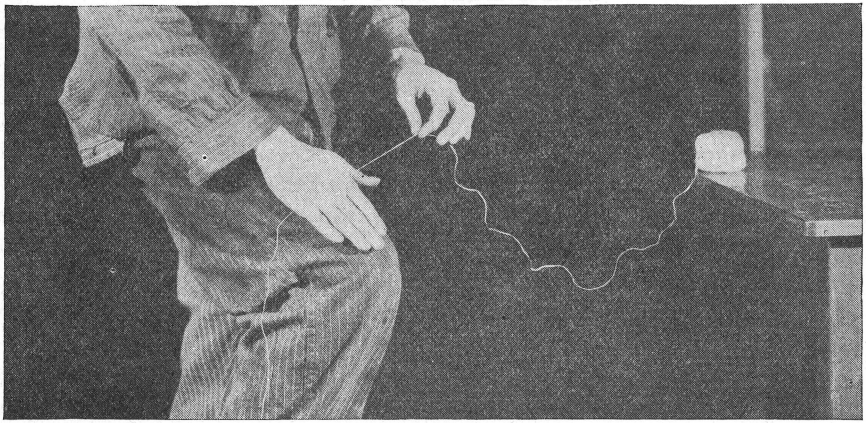


FIG. 17. UNTWISTING LINEN THREAD PREPARATORY TO TEARING IT APART

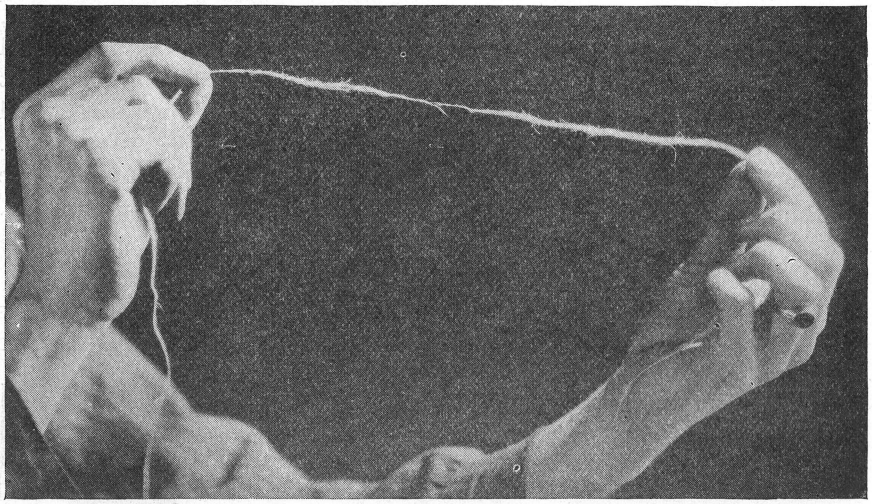


FIG. 18. TEARING THE UNTWISTED LINEN THREAD
Showing the long, slim, tapering point that should result

quickly mastered (fig. 16). After a few trials a thread can be made which will be uniform, strong, and durable.

Measuring

For harness stitching use No. 10 linen thread. Grasping the end of the thread with the thumb and first finger of the right hand and allowing it to pass between the thumb and first finger of the left hand, draw

out about six inches more than the length required for the work to be done. A thread five feet in length can be easily handled. If considerable stitching is to be done, several threads should be made.

Tearing

Now tear the thread in such a way that a long, tapering end will result. To do this, still hold the thread between the thumb and first finger of the left hand, and bring the left hand close to the right thigh, laying the thread over the right thigh. Untwist the thread by rolling it, under the palm of the right hand, away from the body two or three times (fig. 17), until the twist has been removed to such an extent that the thread may be pulled apart with very little effort (fig. 18). If the twist has been properly removed, the ends of the torn thread will be long and tapering. Cutting or breaking a linen thread will leave the ends too blunt for making a waxed harness thread.

Repeat this process, being careful to get all threads the same length, until enough linen threads are obtained to make a harness thread of sufficient strength for the work to be done. The number of linen threads needed will vary from three, for light stitching on reins, hame straps, and the like, to six or seven, for heavy work on hame tugs, traces, and other such pieces.

Assembling

When the waxed harness thread is finished, it should have a long, slim, tapering point which will easily pass thru the eye of a needle and which will not be thicker than the needle when bent back and twisted into the

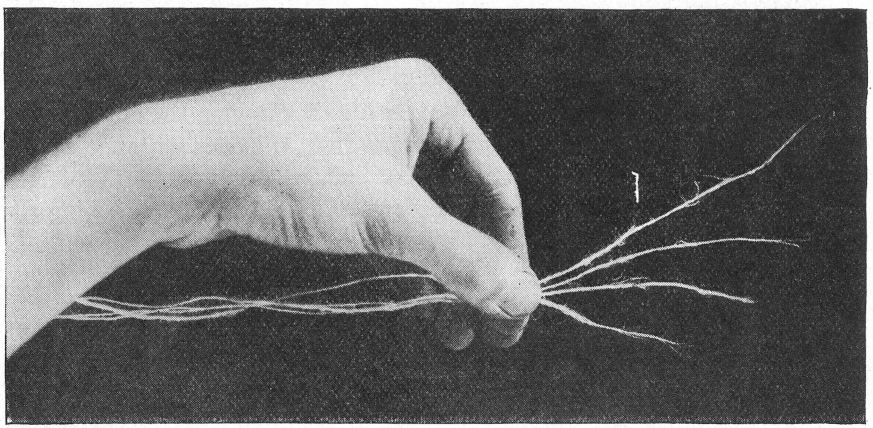


FIG. 19. ASSEMBLING LINEN THREADS

Each succeeding thread should project slightly beyond the one before

thread. When attaching a bristle it is just as essential that the ends of the harness thread be long and tapering. This end is obtained when assembling the linen threads by placing them together so that each succeeding one projects slightly beyond the one before (fig. 19).

The linen threads are now ready to be made into a complete harness thread by being twisted and waxed.

Waxing ends

Waxing the twisted linen threads gives strength and smoothness to the finished harness thread. In order that the waxing may be done easily, a small amount of shoemakers' wax should be placed on a piece of leather

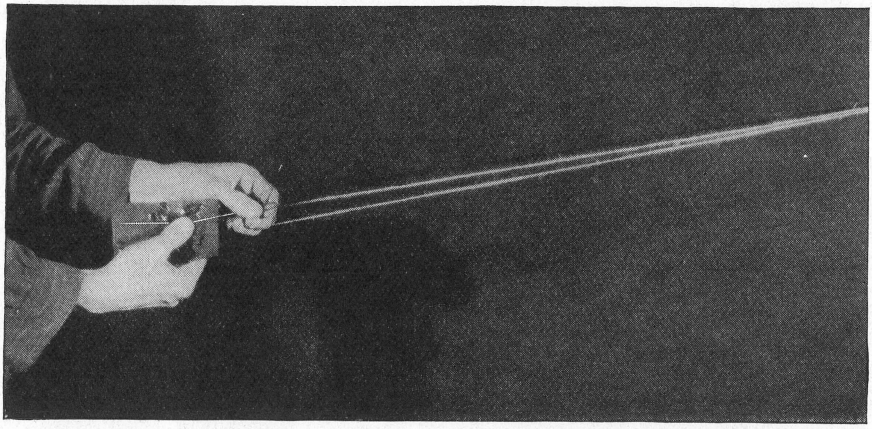


FIG. 20. WAXING THE ENDS OF THE ASSEMBLED LINEN THREAD

about the size of your palm and placed near the stove or other heat so that the wax will melt on the leather.

Place the assembled linen threads over a nail, drawing the ends toward you. Holding the threads about six inches from the ends with the thumb and first finger of the left hand, wax the ends. This is done by placing the ends on the waxed pad and the right thumb on the ends, drawing the pad off from the ends (fig. 20). Three or four strokes should be sufficient to thoroly wax the ends.

Twisting threads

The threads are twisted by rolling first one-half length and then the other half length over the right thigh with the palm of the right hand. At the end of each downward stroke of the right hand the thread should be held between the thumb and first finger of the left hand so that the threads will not untwist while the right hand is being brought into position

for the next stroke. The twist in each half of the threads should now be equalized by drawing the twisted threads back and forth several times over the nail.

Waxing threads

Place one end of the twisted thread over the first finger of the left hand and wind the thread once or twice around the finger. Do the same with the other end on the second finger of the left hand. This protects the ends when waxing the thread. Holding the ends as described, and the waxed pad in the right hand, apply the wax to the twisted threads. This is accomplished by placing the thread on the waxed pad and the thumb on the thread and then moving the pad back and forth vigorously over a short strip of the thread.

Continue using the pad until the entire thread is well waxed and then rub the thread vigorously between the thumb and first finger of the right hand. This will still further melt the wax into the thread and will smooth the wax.

THREADING NEEDLES

Draw one tapered end of the thread through the eye of the needle for a distance of two or three inches and bend it back against the thread. Holding the doubled thread near the needle between the thumb and first finger of the left hand, twist the needle by rolling it between the thumb and finger of the right hand, moving your left hand gradually away from the needle (fig. 21).

If, after waxing, the thread twists and does not draw well, it should be rubbed with beeswax. The beeswax should not be applied to the ends of the thread, as it will prevent the turned, tapered ends from sticking.

TOOLS

Very few tools are absolutely necessary in stitching, altho there are a few, inexpensive, harness-makers' tools which, when used, add to the ease of doing the work and to its appearance when finished. With a sharp pocket or kitchen paring knife, a harness thread, and an awl (fig. 22, A and B), stitching can be done. The spacing of the stitches can be approximated or marked with the aid of a ruler and an awl. The use of a pricking wheel simplifies the work of marking off the stitches. A finishing wheel, however, is usually used for this purpose as it enables one to use the same wheel over the stitching when done and thus does away with the necessity of purchasing two wheels (fig. 22, C.). The finshing wheel improves the finish of the work by making the stitches appear more uniform. The use of a creasing tool (fig. 22, D) and an edging tool (fig. 22, E) gives the work a still further finished appearance.

SPLICING

A single strap may be spliced by stitching, by the use of a Conway loop, or by riveting.

By stitching

The ends of the strap should be cut square. Place one end that is to be spliced near the edge of a wood block or a board on a bench, and, with a knife or a plane, bevel the end for a distance of two or three inches, doing all the cutting from the flesh, or rough, side (fig. 23). The hair, or smooth, side of the leather is much stronger than the flesh side and should not be cut away as this would materially lessen the strength of the splice. Bevel the other end in a like manner, again doing all the cutting from the flesh side.

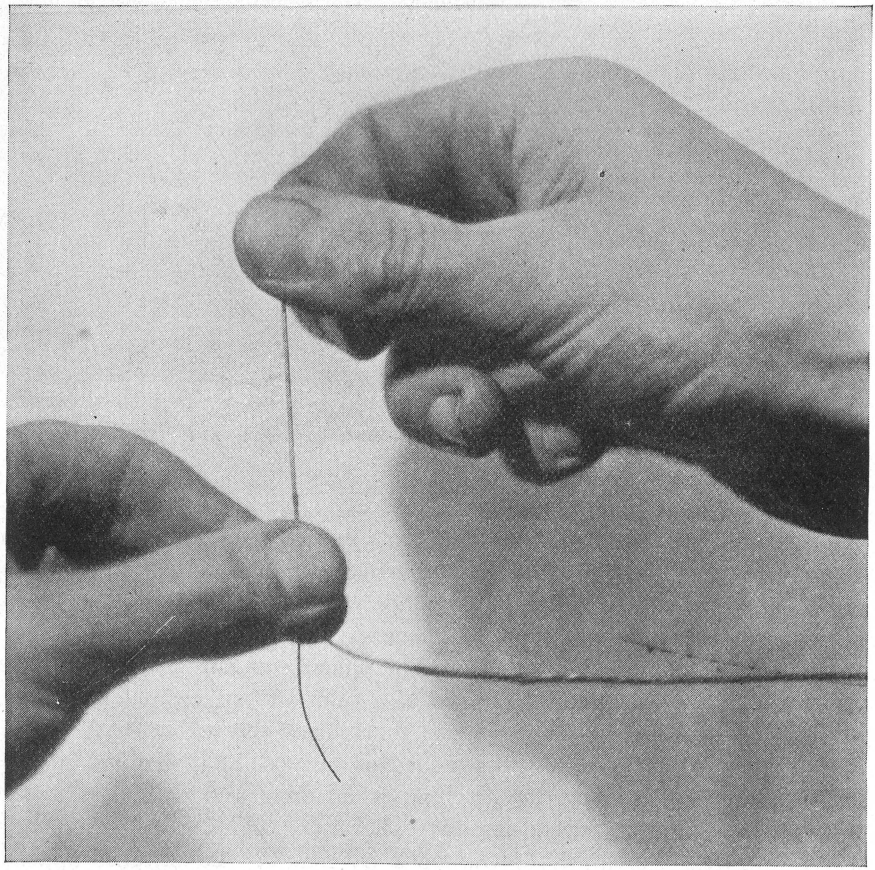


FIG. 21. TWISTING THE TAPERED END DOWN INTO THE WAXED THREAD
The needle should be twisted in the same direction as the twist in the thread

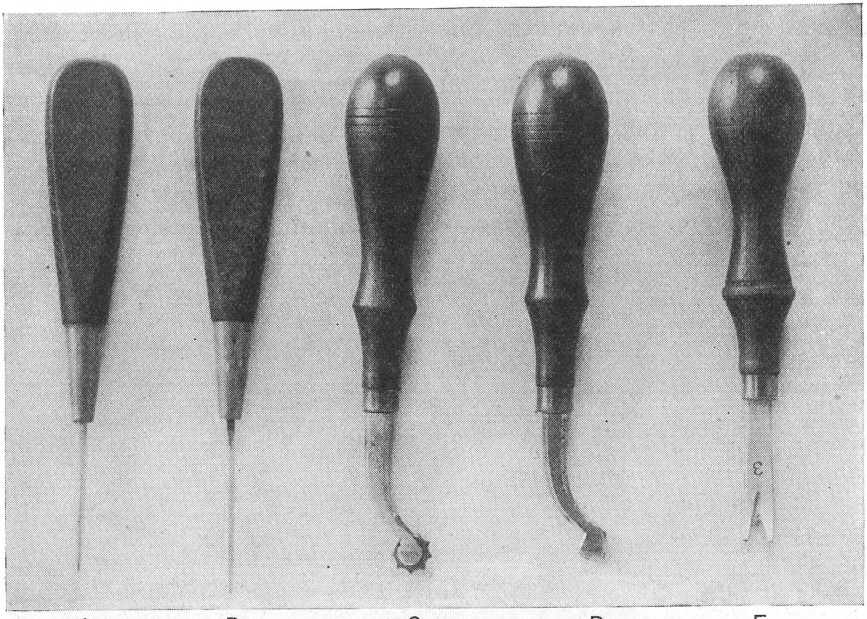


FIG. 22. HARNESS-MAKERS' TOOLS
A and B, Awls; C, finishing wheel; D, creasing tool; E, edging tool

Place one beveled end on top of the other, being sure that the flesh side of each strap is up (fig. 24). The ends may be temporarily held together by two small tacks. On some splices, such as those on reins, lap the ends of the straps three or four inches. Lay a ruler on the smooth side of the overlapping straps and mark off with an awl or

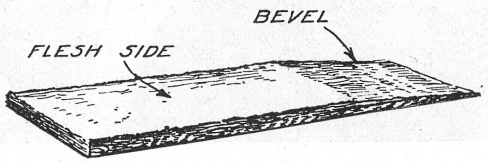


FIG. 23. SPLICING A STRAP
The bevel should be on the flesh side

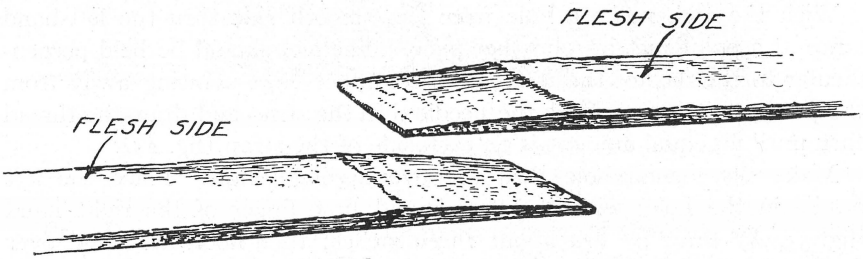


FIG. 24. SPLICING A STRAP
The straight side of one strap is placed in contact with the beveled side of the other

a pointed tool the spaces for the stitches, the end marks being just beyond the splice. If a pricking or finishing wheel is available, lay off on the smooth side of the strap the marks for the awl, guiding the wheel with the finger along the edge of the strap.

Place the straps in the stitching clamp, the smooth side to the right and the strap nearest you to the right, with the upper row of marks close to the jaws of the clamp so that the straps will be held firmly for stitching (fig. 25).

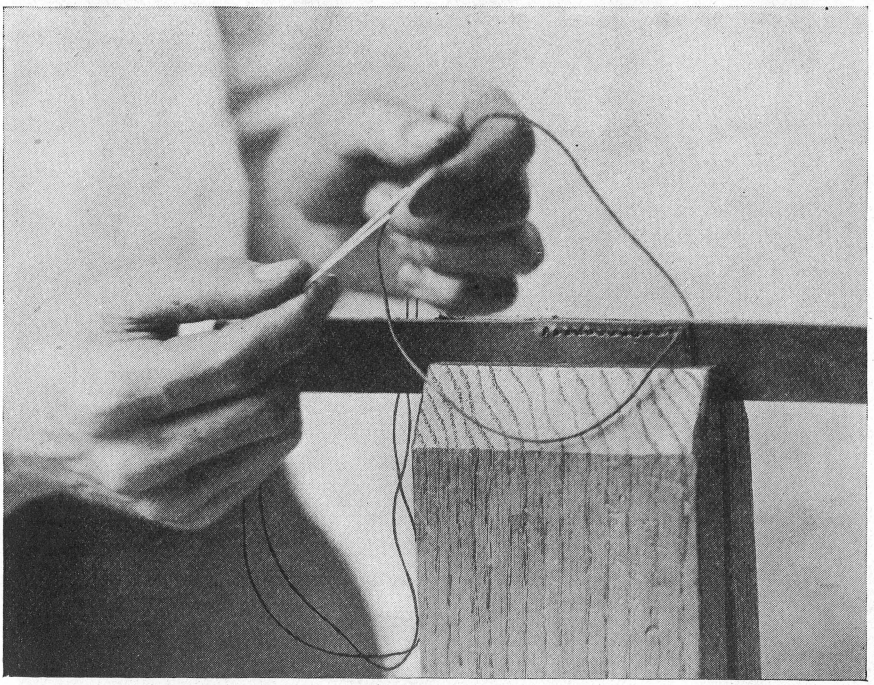


FIG. 25. STARTING A STITCHED SPLICE
The threads should be pulled thru evenly, and the strap nearest the person stitching should be to the right

With the awl, make a hole from the smooth side thru the left-hand strap at a point just beyond the splice. The awl should be held perpendicular to the face of the strap, with its upper edge pointing away from the person stitching. Push the needle thru the strap and draw the thread thru until an equal amount is on each side of the strap (fig. 25).

Make the second hole thru the overlapping straps. Place the left needle in the hole; with the thumb and first finger of the right hand (fig. 53, A)[1] draw it thru about three inches; then hook the hand over it and draw it about a foot.

[1] The stitching shown in figure 53, A and B, has progressed further but the method of stitching is the same.

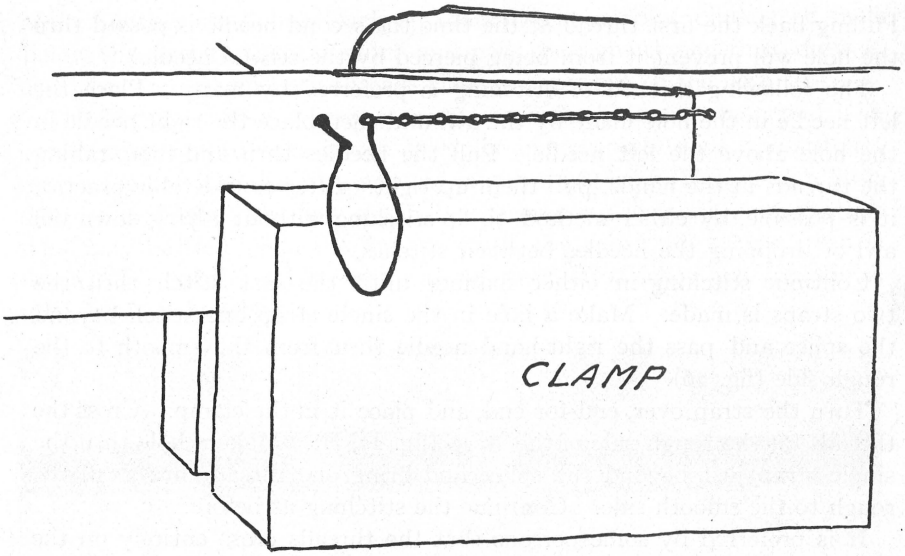


FIG. 26. STITCHING

The right-hand needle is passed thru the right single strap, one stitch beyond the splice

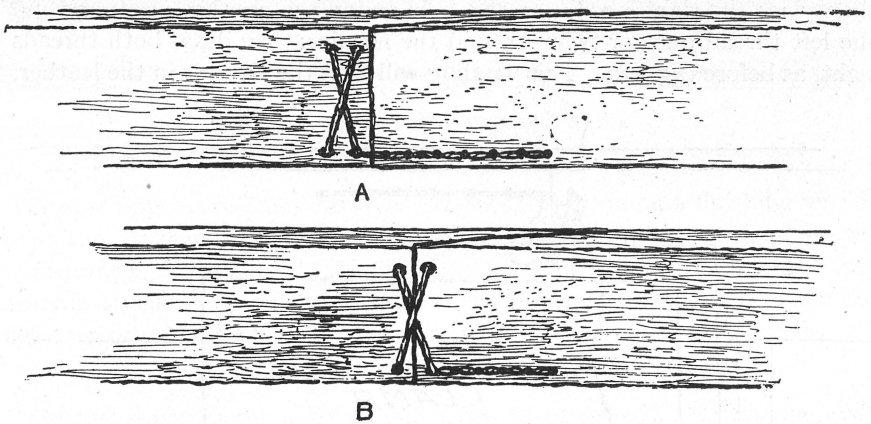


FIG. 27. CROSSING OVER

A, One stitch beyond the splice; B, at the end of the splice

Pass the other needle thru the upper corner of the hole, at the same time pulling back the left thread (fig. 53, B). With the left thumb and first finger draw the needle thru about three inches, then hook the hand over it and draw it out for about one foot. Draw both threads up tigh

Pulling back the first thread at the time the second needle is passed thru the hole will prevent it from being pierced by the second needle.

The following method of stitching is preferred by many. Place the left needle in the hole made by the awl and then place the right needle in the hole above the left needle. Pull the needles thru and then, taking the threads in the hands, pull them up tight. After considerable practice it is possible, by either method, to do stitching without laying down the awl or dropping the needles between stitches.

Continue stitching in either manner until the last stitch thru the two straps is made. Make a hole in the single strap one stitch beyond the splice and pass the right-hand needle thru from the smooth to the rough side (fig. 26).

Turn the strap over, end for end, and place it in the clamp. Cross the threads on the rough side of the strap (fig. 27, B). Make a hole thru the single strap just beyond the splice and bring one thread thru from the rough to the smooth side. Continue the stitching as before.

It is preferred by some persons that the threads cross entirely on the single strap, as shown in figure 27, A, rather than as explained and shown in figure 27, B. This may be done by making one more stitch with the two threads thru the single strap and then making the crossover as explained above.

To finish the stitching, place the left needle and thread thru as usual; then place the right needle in the hole and when in this position, wind the left thread once or twice around the needles; then draw both threads tight, as before (fig. 28). This winding will lock the threads in the leather.

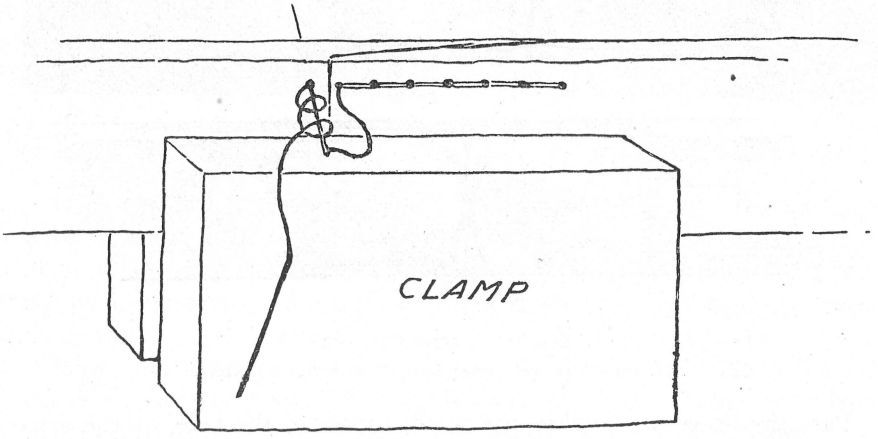


FIG. 28. TYING THE KNOT

The left needle and thread having been passed thru the single strap, the right needle is inserted in the hole and the thread of the left needle is wound two or three times around the right needle

Make another small hole back on the splice at a point one-eighth inch below the next to the last stitch and pass the right thread thru, draw it up tight, and cut off both threads close to the strap on the flesh side.

The harness thread, where it crosses over, is subject to wear, and if it breaks and the stitching is not carefully and properly done, the stitches may come out for some distance and loosen the splice. If desired, a knot may be tied when the last stitch before crossing is made, and another knot may be tied when the first stitch on the other side of the strap is taken. For additional strength, three rows of stitches are sometimes made rather than two.

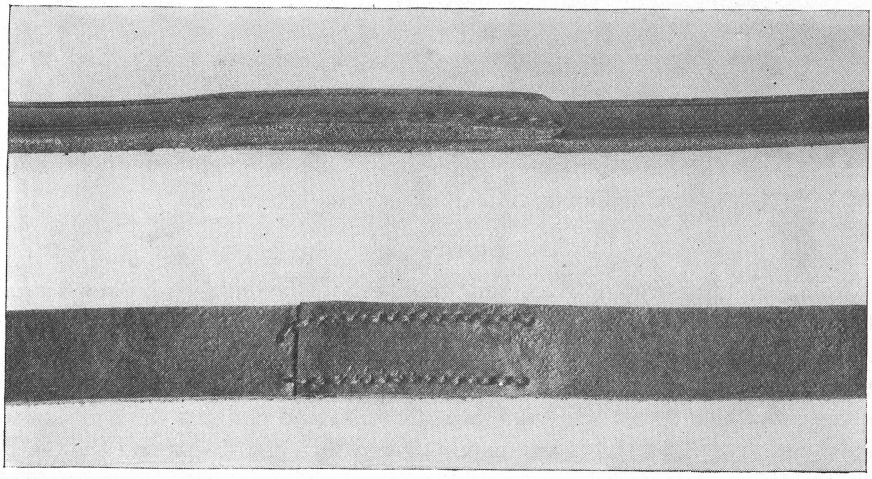


FIG. 29. A FINISHED STITCHED SPLICE

Showing how the stitches have been forced into the leather by the use of a finishing wheel

A neat appearance may be given the work by running a finishing wheel over the stitching (fig. 29). This gives the stitching a more uniform appearance. The hair side should be laid on some smooth surface and the stitches should be pounded down, on the flesh side, with a shoemaker's hammer or other tool.

By use of a Conway loop

Cut off squarely the ends of the straps to be spliced. Insert one end of the strap thru branch X of the Conway loop and thru branch Y, so that it will project slightly beyond Y (fig. 30). Mark and punch the hole for the buckle tongue.

Lay this marked strap on the other, being sure that the ends to be spliced are even. Mark and punch the other hole. Assemble the straps and the Conway loop as shown in figure 30.

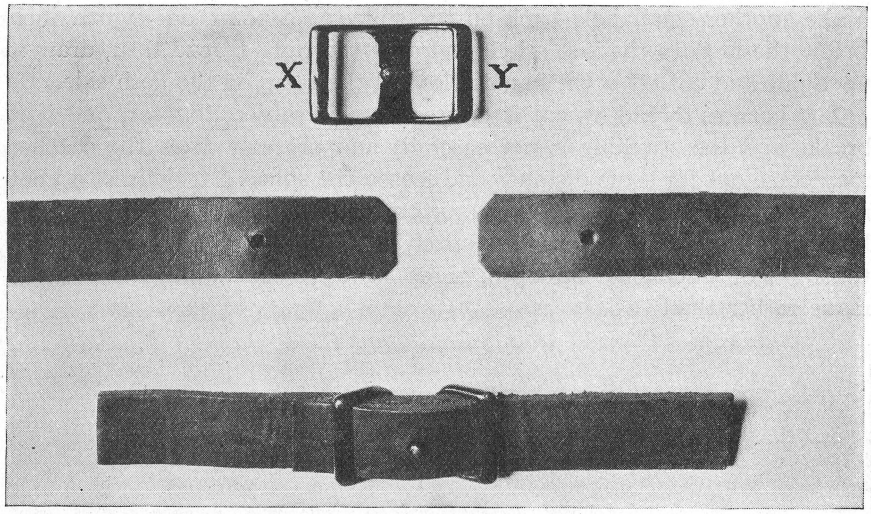


FIG. 30. SPLICING A STRAP BY USE OF A CONWAY LOOP

By riveting

Solid, split, or tubular rivets may be used for fastening a broken strap together. If solid rivets are used, holes must be punched thru the straps and a washer placed over each rivet before the end is riveted down. When tubular rivets are used, a comparatively inexpensive riveting machine is necessary which forces the rivet thru the strap and clinches the end down on the strap. Split rivets are merely driven thru the straps and the ends clinched down.

While a strap may be quickly spliced by the use of a Conway loop or by rivets, these methods should be considered as temporary rather than permanent and should be replaced later by a stitched splice.

MAKING HOLES THRU LEATHER

Holes may be made thru leather in the following four ways:

With a leather punch

A leather punch (fig. 31, A), while very handy for general harness repairing, since from four to six holes of different sizes may be made with it, cannot be used on heavy leather such as traces or for making holes located any great distance from the edge of the leather.

With hollow punches

Hollow punches (fig. 31, F and G) can be used on thick leather and for making holes located away from the edge of the leather. A separate punch is needed, however, for each hole of different size.

With a brace and a bit

The use of wood or metal bits (fig. 31, D and E) is a very satisfactory means of making holes thru leather, especially thick leather. While not as handy or as quick for making holes thru a single strap as either of the two methods just mentioned, their use will eliminate the necessity of purchasing the special tools.

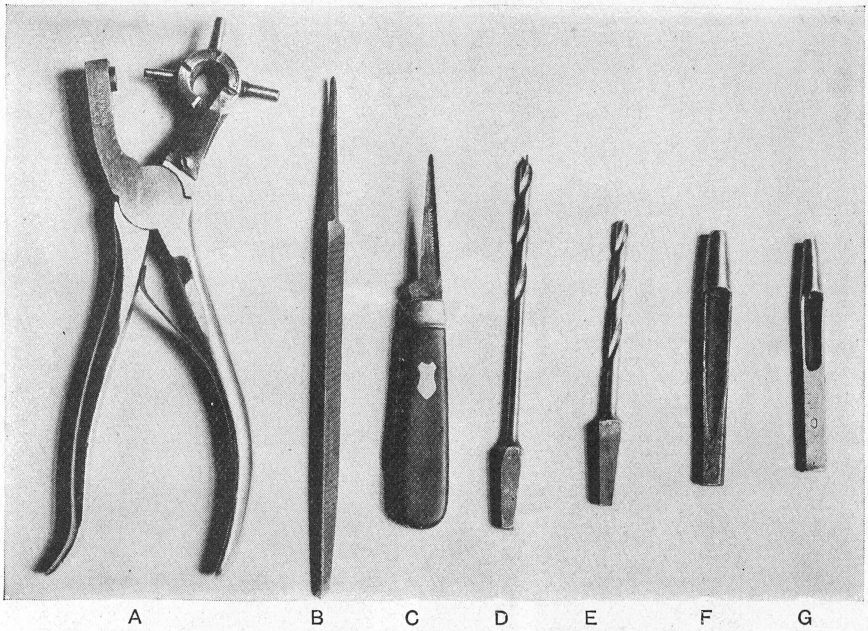


FIG. 31. TOOLS FOR MAKING HOLES THRU LEATHER

A, Leather punch; B, three-cornered file; C, jackknife with awl blade; D, bitstock wood drill; E, bitstock metal drill; F and G, hollow punches

With a brace and a three-cornered file

If neither wood nor metal bits of proper size are available, a three-cornered file may be used instead. Sharpen the handle end of the file to a point by grinding or filing. Insert the file in a brace and use as you would a wood or metal bit (figs. 31, B, and 32).

REPAIRING A TRACE

The breaking of a hame tug or a trace is a common occurrence on all farms, and the various methods of repair and the different kinds of repair parts available for this work are naturally of interest. The type of repair

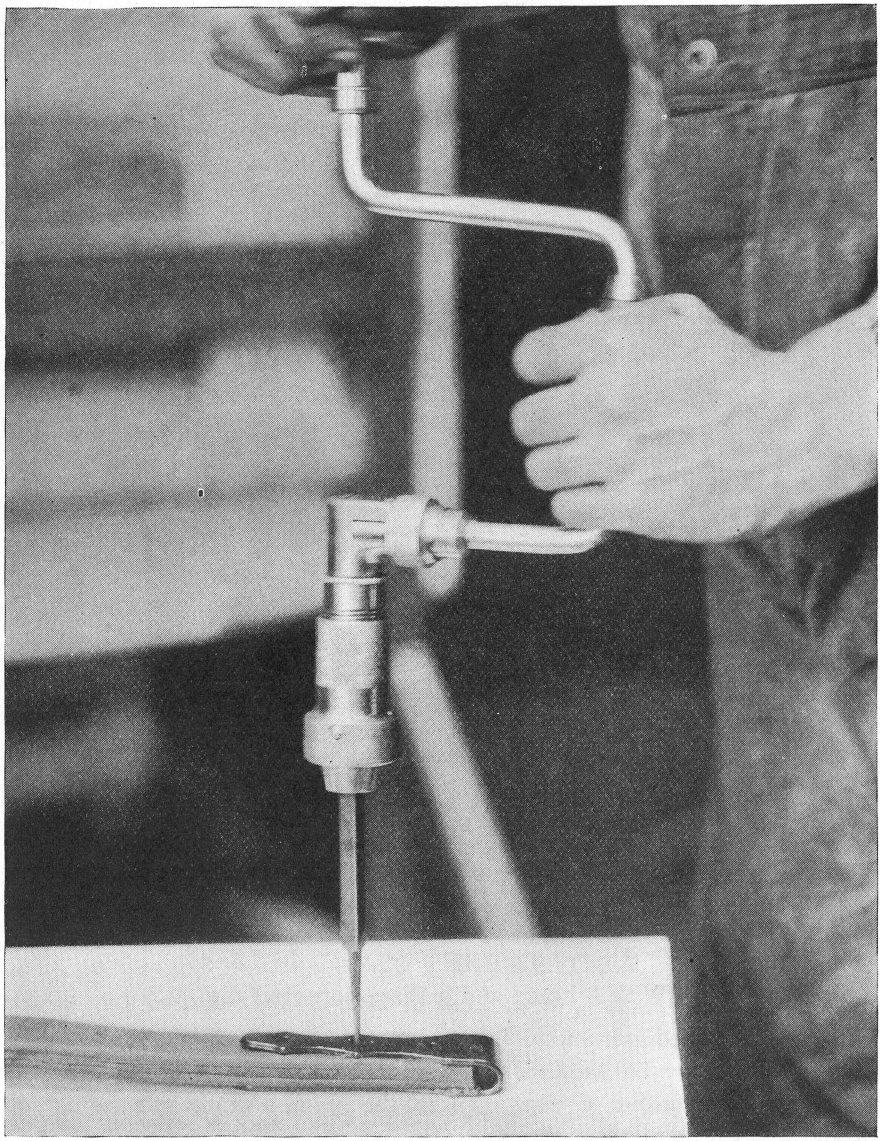


FIG. 32. DRILLING A HOLE THRU LEATHER WITH THE SHANK OF A THREE-CORNERED FILE

job and the kinds of repair parts used will vary according to the location of the break and the individual preferences of the person making the repairs.

At the cockeye end

Should a trace break at the loop holding the cockeye, it may be repaired by a stitched splice or by the use of a Concord clip.

By a stitched splice

As a stitched splice is a rather difficult and tedious repair job and one which the average farmer would hardly undertake, the method of making it will not be covered in detail. It necessitates the insertion of a length of extra strap and two stitched splices. In order that the trace when repaired may not be bulkier than necessary, one end of the new strap is spliced to the trace near the cockeye, then inserted thru the cockeye end, carried back beyond the first splice, and spliced to the trace.

By a Concord clip

Cut the trace off square just back of the torn loop. Mark the holes for the rivets which are to pass thru the Concord clip. This may be done best by inserting the end of the trace into the clip with the cockeye in position in the clip. This will assure the proper location of holes so that the cockeye will be free to swing. In case the clip does not pinch the strap it should be made to do so in the following manner: Place the head of the Concord clip on some solid metal, surface, and with a hammer strike the head of the clip, thus forcing the ends down until they pinch the strap.

Punch the holes as marked, assemble the trace, concord clip, and cockeye (fig. 33), insert one rivet, and while holding the head of the rivet on some solid metal surface, rivet the end securely, being sure that all parts are

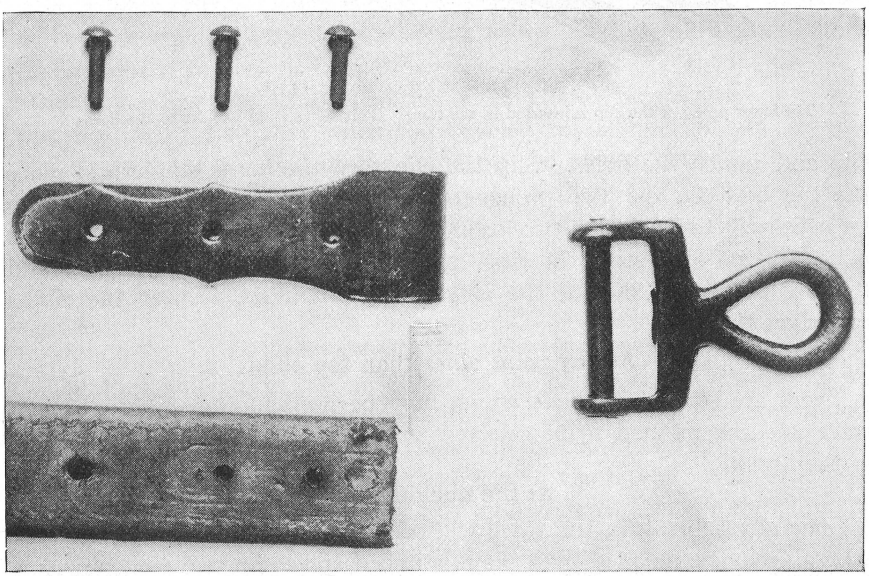


FIG. 33. REPAIRING THE END OF A TRACE WITH A CONCORD CLIP
A repair cockeye is shown

snugly together. Upset the other two rivets in a like manner. The use of a rivet set will add to the appearance of the work.

At the hame end

Because of the friction between the hame clip and the hame staple and the resulting wear on both staple and clip, it becomes necessary at times to renew the hame clip, or the hame staple, or both.

To renew a hame clip, take out the old rivets and remove the hame clip from tug. If the old rivet holes are badly worn, cut off a short piece from the tug. With the clip in place on the tug, mark holes for the rivets. If desired, a longer clip with three holes may be purchased. Remove the

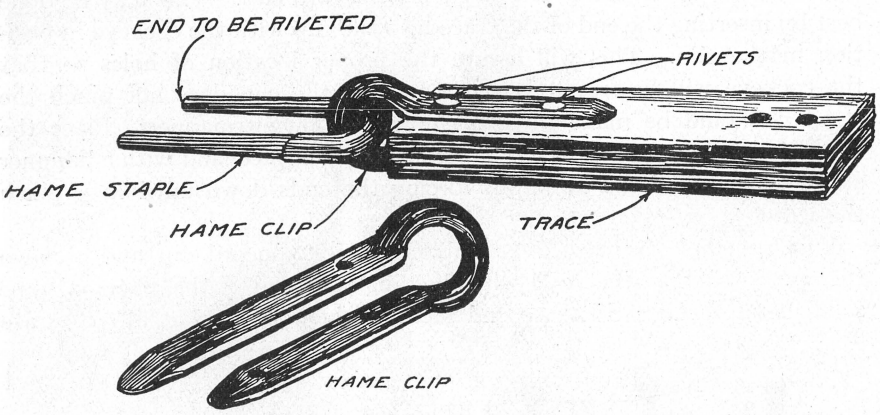


FIG. 34. RENEWING A HAME CLIP
The lower prong of the clip is inserted in the trace. This side should be next to the horse

clip and punch the holes. Slip the clip thru the hame staple and place the tug between the two prongs of the clip (fig. 34). It will probably be necessary to draw the two prongs of the clip close to the tug. This may be done by resting the ring end of the clip on a metal surface and striking the outer side of the ring with a hammer. Enter the rivets and rivet the ends.

At any point other than the ends

There are several methods which may be used for mending a broken trace and the method to be selected will depend largely on the location of the break.

At the buckle holes

Generally a break in the trace will occur at the buckle holes and such a break may be mended by a plain, stitched splice, by two Concord clips and a trace square, or by two hame clips and a link.

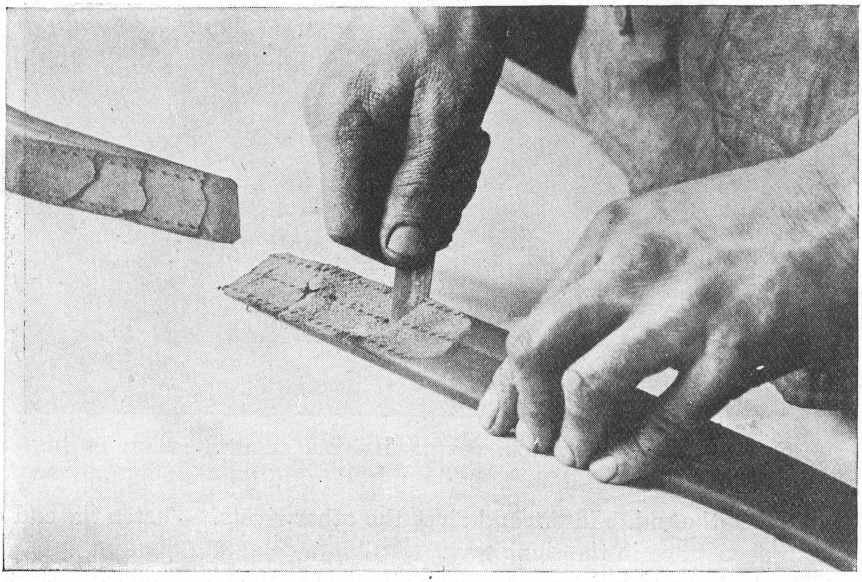


FIG. 35. SPLICING A TRACE CUTTING THE STITCHES
The bevel should be cut on different sides of the trace

By a plain stitched splice

If a plain stitched splice is used, the trace will be necessarily shortened a distance equal to the length of the splice. The broken ends should be cut square and beveled back for a distance of six or eight inches. The stitches holding the straps together should then be cut back for some distance (fig. 35) so that when the beveled trace ends are put together the straps from one end of the trace can be placed between the straps from the other end of the trace (fig. 36). Place the trace in a clamp and stitch as previously described, using a heavy harness thread of from six to eight linen threads. The objection to this method of repair is that a rather bulky splice is formed in the trace where it passes thru the buckle.

With two Concord clips and a trace square

Cut the hame tug at the buckle. Cut the broken trace off square at the break. Place the end of the trace in the Concord clip, leaving enough clearance between the end of the trace and the end of clip so that the trace square may move freely. Mark the holes for the rivets. Mark the holes on the end of the hame tug in a similar manner. Remove the clips and punch the holes.

Assemble the hame tug, the trace square, and the Concord clips (fig. 37, D). Insert one rivet and, resting its head upon some solid metal sur-

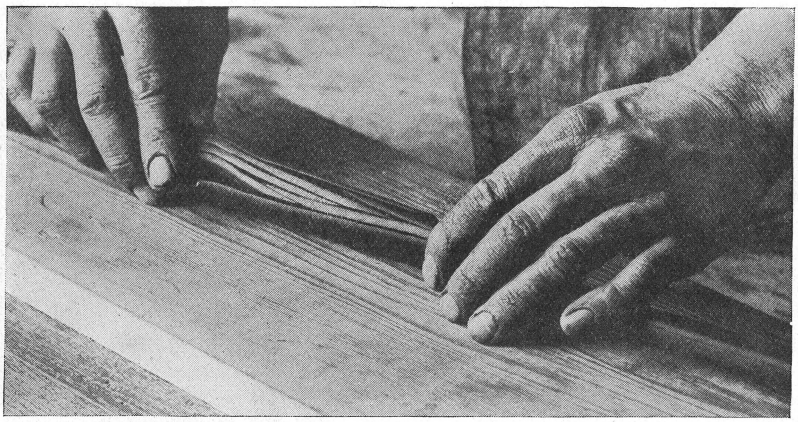


FIG. 36. SPLICING A TRACE: DOVETAILING THE LEATHER STRAPS AT THE BEVELED ENDS

face, rivet the end. Insert and rivet the other rivets. Fasten the end of the broken trace in the same way.

The belly-band billet must now be attached to the trace square. It may be stitched on, or a snap may be attached to the billet and the billet then be snapped to the square.

As a result of substituting the two Concord clips and the trace square in place of the buckle and the cutting off of the trace, an adjustment for the length of the trace is no longer possible. To overcome this objection and to provide an adjustment, a heel chain must be attached.

With two hame clips and a link

The procedure when using two Concord clips and a trace square, or two hame clips and a link is about the same (fig. 38). The use of the

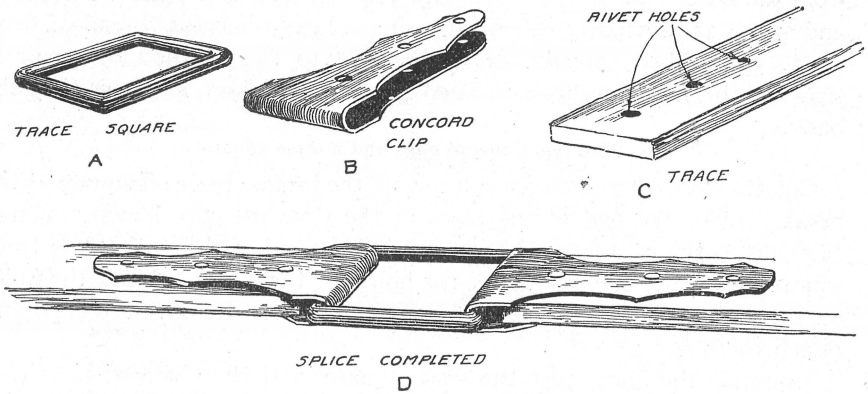


FIG. 37. REPAIRING A TRACE WITH TWO CONCORD CLIPS AND A TRACE SQUARE

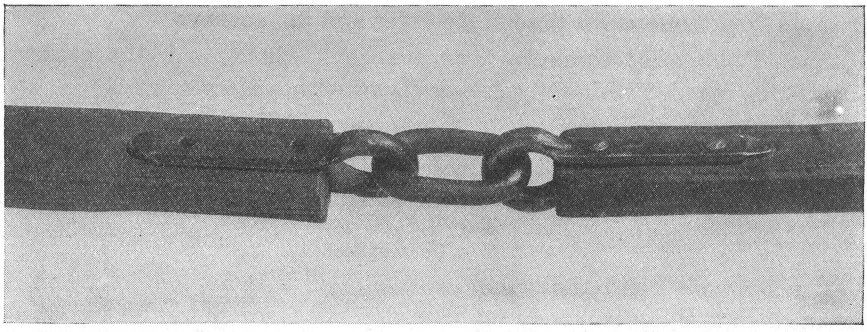


FIG. 38. REPAIRING A TRACE: USING TWO HAME CLIPS AND A LINK

The prong of each clip on the side of the trace next to the horse may be inserted in the trace before riveting, especially if the trace is thick

hame clips and link, however, gives a much more flexible joint, and is, therefore, considered preferable as a method for splicing a trace broken at the buckle holes (fig. 39).

Should the harness have a short hame tug and the trace break at the buckle holes, it may be mended by using a trace splicer and heel chains, or by attaching the trace, if long enough, to the hame and using heel chains. A stitched splice might also be used.

If the first method is used, cut the short hame tug off at the bail, cut the trace off square at the break, and splice with a trace splicer. Be sure that the trace, when spliced, is as short as will ever be needed. Attach the heel chain for adjustments.

With the second method, cut the trace off square at the break, if the trace is long enough, and after removing the short hame tug, attach the trace directly to the hame. Add the heel chains for adjustments.

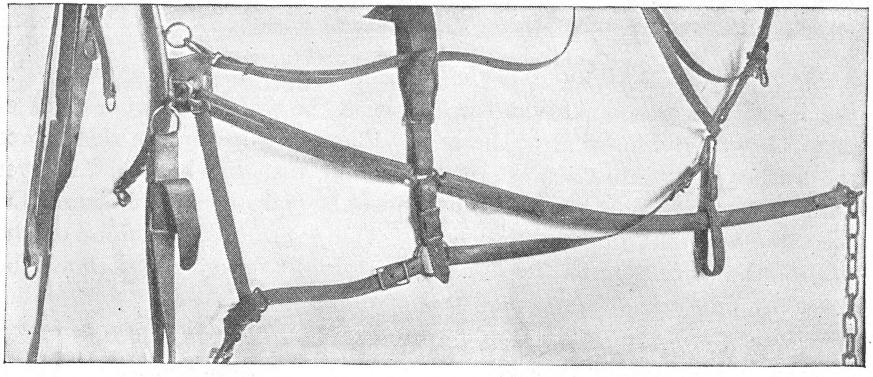


FIG. 39. A TRACE MENDED WITH TWO HAME CLIPS AND A LINK

Showing the belly-band billet and the back-band billet attached to the link

Between the buckle holes and the cockeye

Should the trace break between the buckle holes and the cockeye, it may be mended with a stitched splice or with a trace splicer.

By a stitched splice

The procedure would be the same as explained on pages 50 to 55. When the break occurs as stated above, the bulkiness of a stitched splice is no longer objectionable.

With a trace splicer

Cut the ends of the broken trace square so that a good joint can be formed. Place the two ends together, lay the trace splicer on top, mark

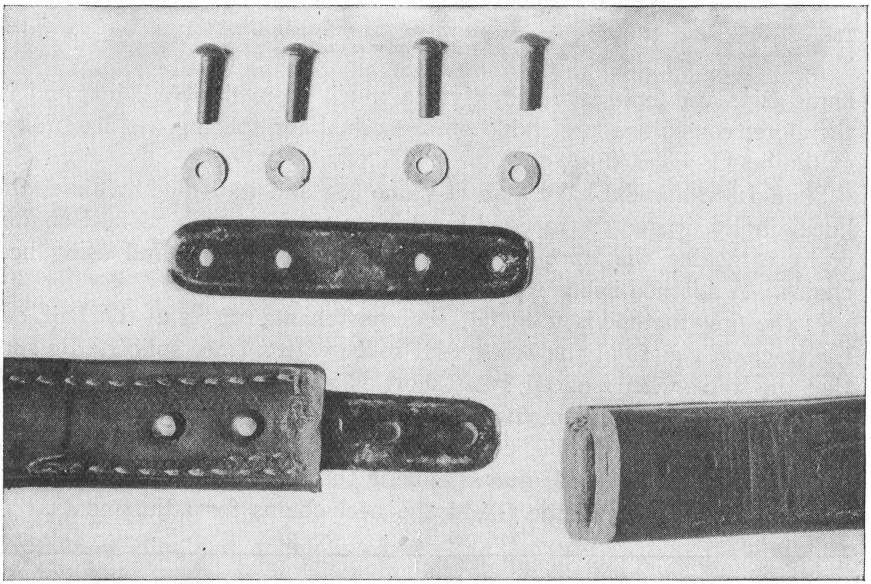


FIG. 40. REPAIRING A TRACE WITH A TRACE SPLICER

the holes, and punch. Insert the splicer in the trace. Select a rivet of proper length and insert it in the hole. Place a washer on the rivet, force the washer down snug against the trace, and, with the head of the rivet resting on some solid metal surface, rivet the end over the washer. Do the same with the other three rivets. The rivet head should be on the side of the trace next to the horse (fig. 40). The riveted end should be smoothly finished.

ATTACHING A SNAP OR A BUCKLE TO A STRAP

Many times it is necessary to attach a buckle or a snap to a new strap, or to repair a strap from which a buckle or a snap has torn out. This may be done by any one of the following four methods:

By a stitched loop

The strap should be prepared as explained below and the stitching should be done as described on pages 50 to 55. If it is desired to stitch in a loop, see page 74.

By a riveted loop

Cut the corners off from the end of the strap as shown in figure 41, A. Mark the first hole between two and one-half and three inches from the end of the strap. Mark another hole about one inch from the first hole. The distance between these holes should be such that the buckle is allowed a free movement. Punch the holes, using a punch of sufficient size so that the slit in the leather will allow the buckle tongue free play.

Bevel the end for a distance of about three-quarters of an inch. Cut out the leather between the two punched holes (fig. 41, B).

Place the buckle in position. Enter the rivets from the long side of the strap, locating the first rivet from one-half to three-quarters of an

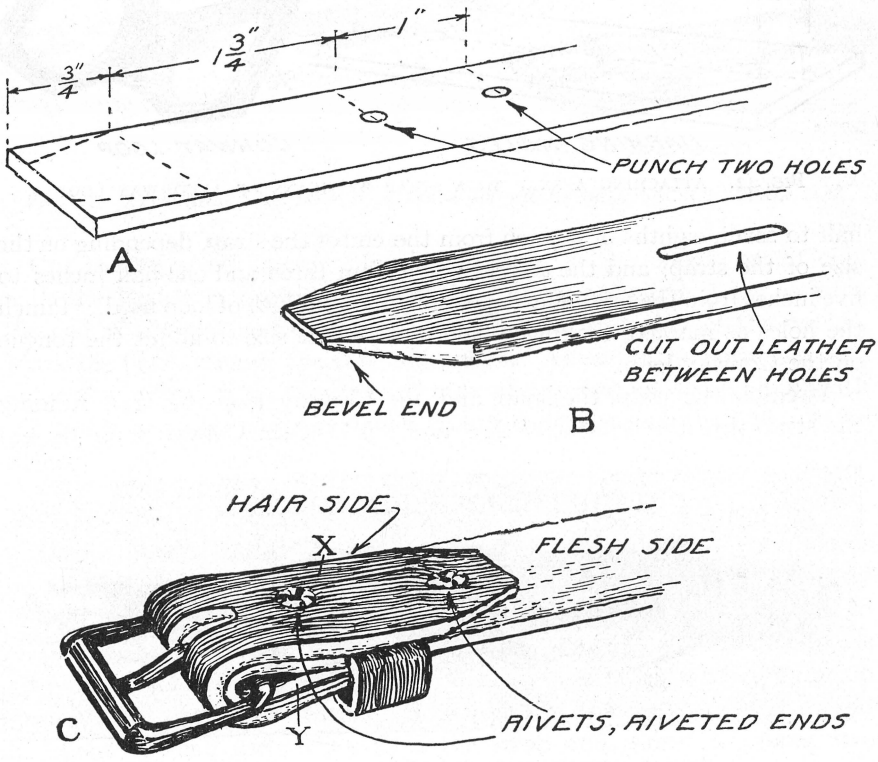


FIG. 41. ATTACHING A BUCKLE TO A STRAP BY UNITING

inch from the end of the slit and the second rivet from one-half to three-quarters of an inch from the end of the strap. Usually a slide loop is attached to the strap just back of the buckle to hold the end of the strap when slipped thru the buckle. A ready-made slide loop may be purchased and slipped under the end " X " (fig. 41, C) before the end rivet is inserted. If a slide loop is to be attached, the strap " X " in figure 41, C should extend back three or four inches from the buckle.

It is well to insert an extra piece of leather in the bend of the strap to take the wear resulting from the buckle. Such a piece, when inserted, will add to the life of the strap (fig. 41, Y).

By a Conway loop

Cut the end of the strap square. Locate a center line " A–B " (fig. 42) and on this line place marks for two holes, the first to be from one-

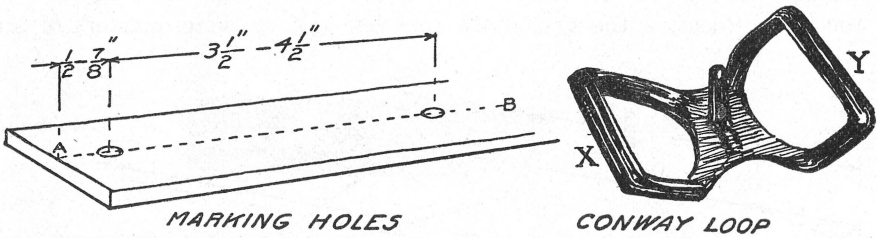


FIG. 42. ATTACHING A SNAP TO A STRAP BY MEANS OF A CONWAY LOOP

half to seven-eighths of an inch from the end of the strap, depending on the size of the strap, and the second to be from three and one-half inches to five inches from the first hole, depending upon the size of loop used. Punch the holes as marked, making a hole of sufficient size to admit the tongue on the Conway loop.

Assemble the strap, the snap, and the Conway loop (fig. 43), running the strap thru the branches " X " and " Y " of the Conway loop (fig. 42)

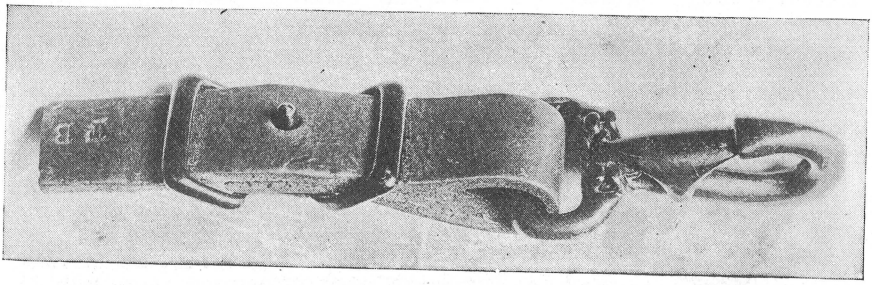


FIG. 43. STRAP, CONWAY LOOP, AND SNAP ASSEMBLED

around the snap and back thru branch "Y." Insert the tongue first thru the hole at the end of the strap and then thru the other hole. Draw the strap tight.

Should it be desired to attach a buckle by means of a Conway loop, the procedure is the same as above, except that a slit to admit the buckle tongue must be cut in the strap. Always punch the ends of the proposed slit and cut out the leather between.

By a buckle repair clip

The use of a stitched or riveted splice, or of a Conway loop, will necessarily shorten the strap. If the strap should not be shortened a buckle repair clip may be used. This clip may be used for attaching either a snap or a buckle.

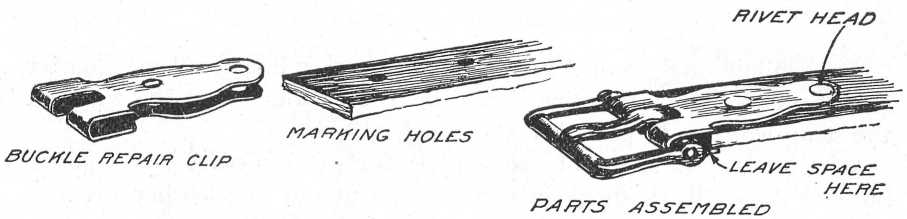


FIG. 44. ATTACHING A BUCKLE TO A STRAP BY MEANS OF A BUCKLE-REPAIR CLIP

Cut the strap off square. Insert the strap in the buckle repair clip, with the buckle in position in the clip. Allow sufficient room between the end of the clip and the end of the strap for free play of the buckle. Mark the holes, remove the clip, and punch. Assemble the parts (fig. 44), enter the rivets from the smooth side of the leather strap, and with the heads resting upon some solid metal surface, upset the ends of the rivets.

A HOMEMADE BUCKLE SHIELD

Many times a shield should be placed over buckles at certain places on the harness to prevent the buckle tongue from catching in the fly net, as on a line buckle, or to prevent the horse's tail from catching in the buckle tongue, as on the hip straps (fig. 45). Such buckle shields may be purchased, or a shield may be easily and quickly made at home from a piece of flexible leather. The width of the piece selected should be about one-half inch wider than the strap and should be about two inches in length. Longer shields will sometimes be needed.

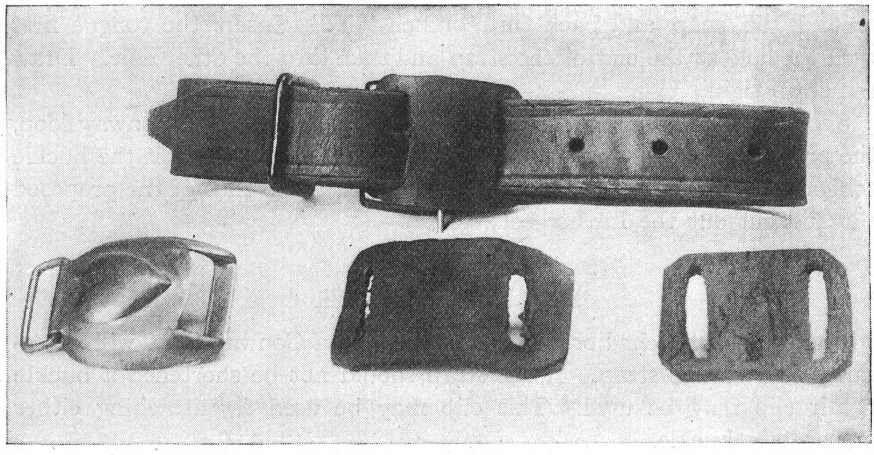


FIG. 45. A COMMERCIAL AND A HOMEMADE BUCKLE SHIELD
Showing the homemade buckle shield in place on the strap

At each end, and parallel with the ends, mark a line about one-quarter inch from the end. This line should be a little wider than the width of the strap which is to pass thru the buckle shield.

With a punch of sufficient size to allow the strap to enter easily, punch holes at A and B, as shown in figure 46. Cut out the leather between the holes with a knife.

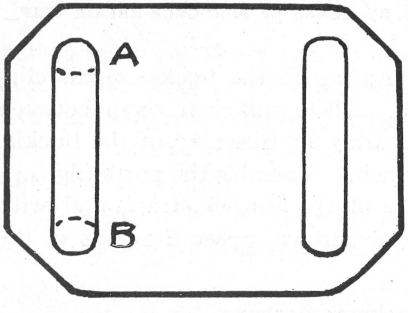


FIG. 46. DIAGRAM FOR MAKING A BUCKLE SHIELD FOR A ONE-INCH STRAP
Actual size

A neater appearance is obtained by cutting off and rounding the corners of the shield as shown.

HAME REPAIRS

Because of the friction between the hame clip and the hame staple and the resulting wear on both the staple and the clip it becomes necessary at times to renew the hame clip or the hame staple, or both. The lower hame clip and the hame loop are also two parts subject to much wear and are, therefore, many times in need of attention. The holdback plate and the line ring, while giving trouble at times, do not need nearly as much attention as do the lower hame clip and the hame loop.

Renewing a hame staple

Remove the old staple by filing or cutting off the riveted end and driving the staple out with a punch. Many times the riveted end is

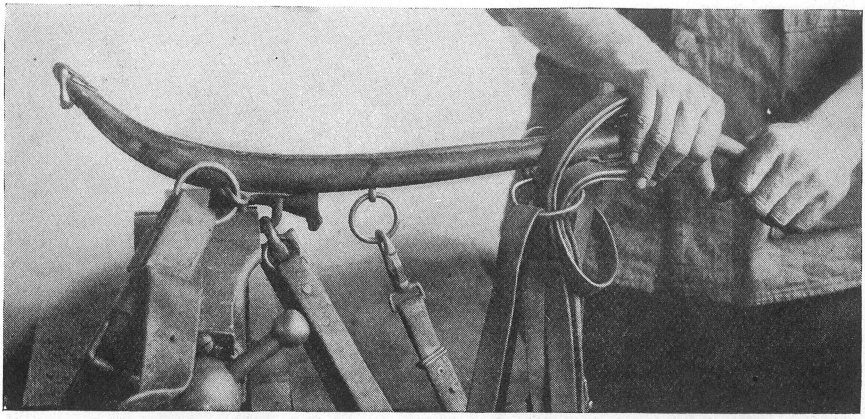


FIG. 47. REMOVING A HAME STAPLE

One-half of the staple is placed in the corner of a vise. Moving the hame back and forth will break the staple

sunken in the hame so that the filing or cutting of the end becomes very difficult. Under such conditions, an easier and much quicker means of removing the old staple is as follows:

Place one-half of the staple in the corner of a vise. Grasping the end of the hame (fig. 47) move it back and forth until the staple breaks (fig. 48). If the staple is broken this first step is unnecessary.

With the hame staple in the vise as before, clasp the hame at the end and move it up and down. This will break the half of the staple off close to the hame and below the shoulder (fig. 49).

Insert the other half of the hame staple in the vise and break it off as described above. If the staple is not tapered, the broken parts remaining in the hame may be driven out. If the staple is tapered, these broken parts may be driven out far enough so that the riveted ends can be cut off, and then these tapered parts can be driven back out.

Insert the new hame staple and drive it snugly in place. Insert one-half of the staple in the corner of a vise, and cut off the excess length, using a hack saw, a file, or snips. Place a washer over the end and rivet the staple securely (fig. 50). Finish the other end in a similar manner.

To replace a holdback plate, the old hame staple must be removed and probably a new one placed in the hame, as described above.

The method of renewing a rein ring is about the same as that used in renewing a hame staple.

Renewing the lower hame clip

Place the hame in a vise, cut or file the riveted end of the rivet, and drive the old rivet out with a punch. Place the old hame loop, or the

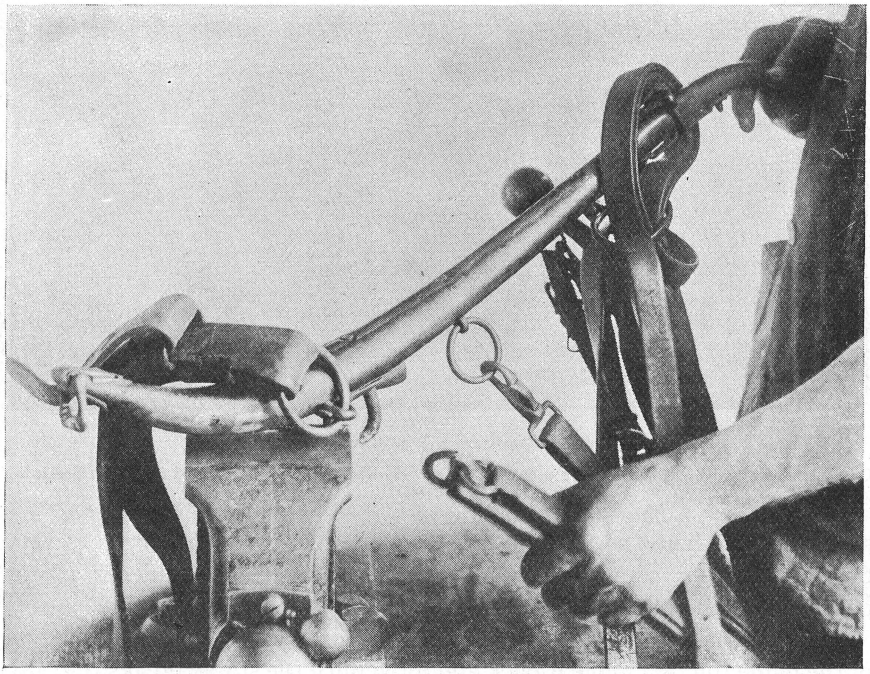


FIG. 48. REMOVING A HAME STAPLE

The staple is broken and the tug removed

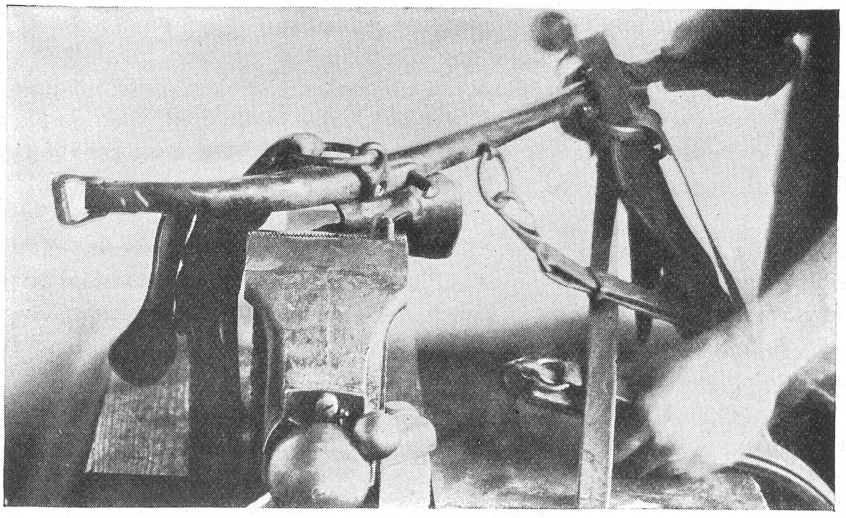


FIG. 49. REMOVING A HAME STAPLE

Moving the hame up and down breaks the half of the staple off. Half of the staple is seen, broken close to the hame and below the shoulder

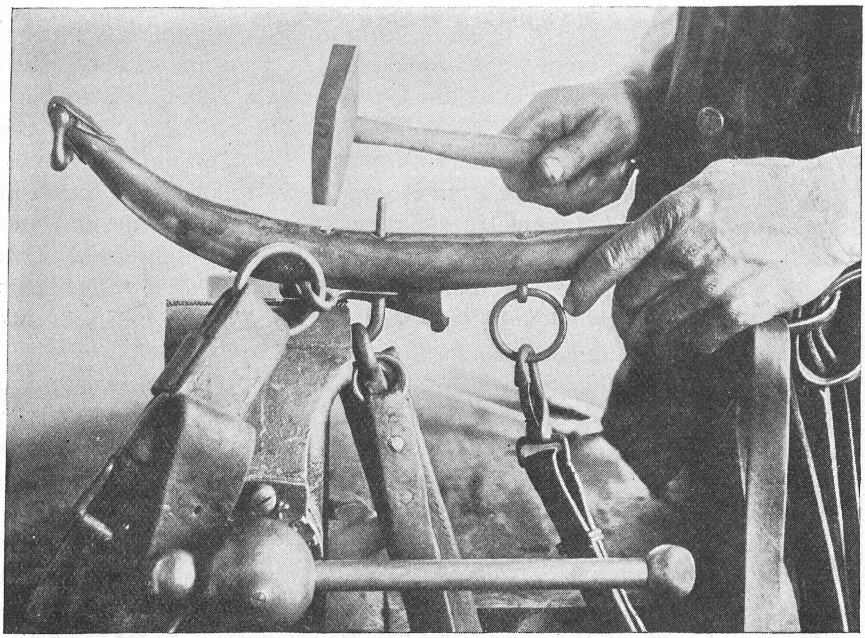


FIG. 50. RIVETING ON THE NEW HAME STAPLE
Showing extra length cut off and washer placed on before riveting

new repair loop, in the new hame clip and insert the end of the hame into the hame clip, running the new clip up under the old iron, and placing side "A" (fig. 51) of the clip on the inside of the hame. It may be necessary to shape the hame slightly to fit the clip.

Insert the rivet from the outside of the hame, running it thru the hole in the old iron, thru the hole in the new clip, thru the hame, and then thru the other hole in the clip. Place the rivet head on some metal surface and rivet the end. With a file, or with a file and a hack saw, make a cut in the old iron just below the rivet head, and break the old iron off. Smooth the edges with a file after bending the end down against the new clip.

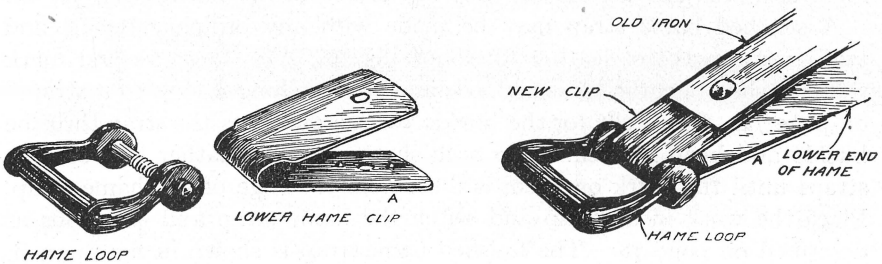


FIG. 51. ATTACHING A LOWER HAME CLIP

MAKING A HAME STRAP

There are many different ways of making a hame strap, some of which are herein explained. The standard type having a buckle and two slide loops, as shown in figure 52, B, C, or D, is the one best adapted for use at the top of the hames. When used at the lower end of the hames, however, the standard type of strap is sometimes troublesome because in tightening the buckle frequently slides away from one hame end and jams against the other before the hames are sufficiently tightened. This difficulty is eliminated by the use of the Jones hame-strap attachment (fig. 52, E) which includes with the buckle a metal hook that prevents the buckle from sliding and also shields the strap from wear.

A strong strap about one inch in width and from twenty to twenty-five inches in length should be used. One end of the strap should be given a slight taper and a series of holes should be punched for the buckle tongue. Except when using the Jones hame-strap attachment, the other end should also be tapered for a distance of two or three inches.

If a Jones hame-strap attachment is used (fig. 52, E), cut the end of the strap square, place the square end of the strap, flesh side down, on the flat side of the hame-strap attachment, and mark the two holes for the rivets. Punch the holes and assemble the parts. Enter the rivets from the smooth side of the strap and rivet the ends (fig. 52, F).

To make a hame strap of the same length as above when using a union loop and buckle or any of the following methods, a longer strap is necessary, as the strap must be passed thru the buckle and bent back for fastening. If a union loop and buckle is used, a slit must be cut for the buckle tongue and the strap assembled and riveted, as shown in figure 52, D.

A hame strap may be made with an ordinary buckle and two slide loops. These may be obtained in various widths from a harness-supply house. Cut the slit in the strap for the buckle tongue. Place the strap thru one loop, then thru the buckle. Bending the strap back, pass it thru the other loop and rivet the strap, placing one rivet between the loops and one just beyond the loop farthest from the buckle (fig. 52, C).

A stitched hame strap may be made with any ordinary buckle and two short lengths of leather for loops (fig. 52, A). Measure and mark the two short lengths, as explained, under "Stitching a loop to a strap," on page 74. Cut a slit for the buckle tongue and pass the strap thru the buckle and bend it back. Slip both short pieces of leather between the straps until the mark on them is flush with the edge of the hame strap. Place the work in a clamp and stitch the hame strap and the loops as described on page 76. The finished hame strap is shown in figure 52, B.

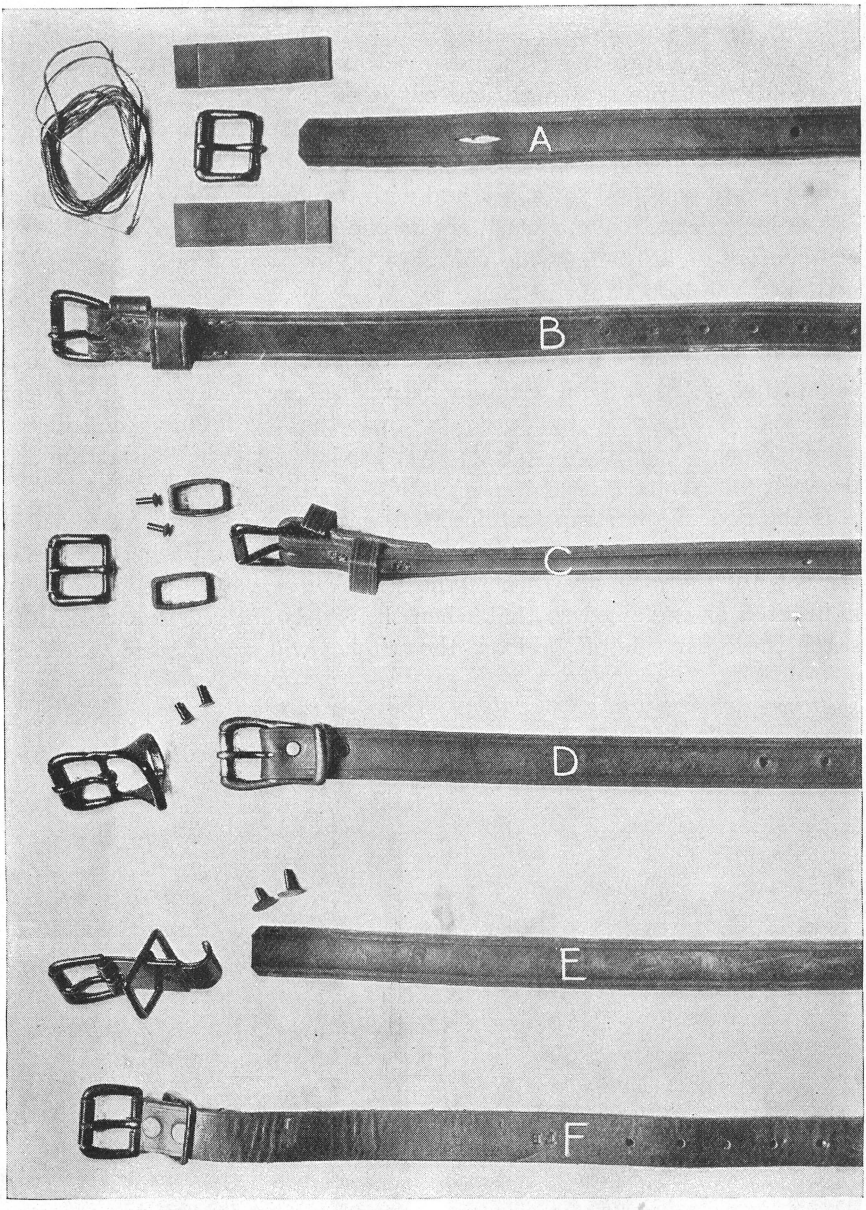


FIG. 52. VARIOUS METHODS OF MAKING A HAME STRAP

A, Materials for a stitched strap; B, stitched strap complete; C, materials for making a united strap, and strap complete; D, a hame strap made with a union loop and buckle; E, materials for making a strap with a Jones hame-strap attachment; F, completed hame strap

STITCHING A LOOP TO A STRAP

Use a strip of leather for the loop. Measure it for length by bending it around the strap or straps, and cut it off. When measuring for the length, be sure to allow for the strap or straps which are to enter the loop.

With the strip of leather which is to form the loop cut to proper length and in position around the strap, and with the ends together at the center of the long strap, make a mark across one end of the loop strap, about one-quarter of an inch inside the edge of the long strap. Notice the marks on the loop straps in figure 52, A.

Insert the loop strap between the straps to which it is to be stitched, with the mark flush with the edge of the straps. Place the work in a clamp (fig. 53, A) and stitch this loop strap in as previously explained under stitching. After stitching one side, cross the threads over and before stitching back, bend the loop strap over the long strap and insert the end between the straps.

If the end of the strap first inserted has been properly marked and properly inserted, the ends of the loop strap will butt together nearer the edge of the long strap where the stitching is plain. The loop strap is inserted as explained so that when the awl is entered at an angle, to stitch the other side of the loop, the stitches will surely pierce the loop

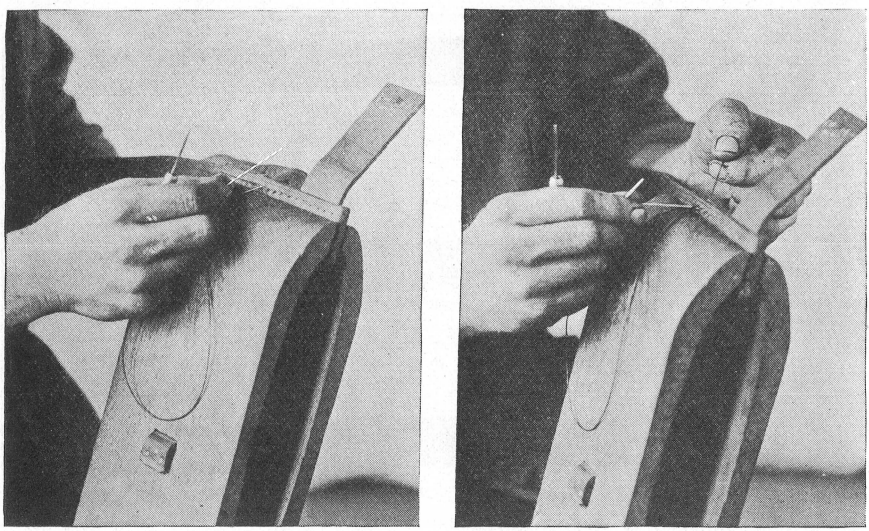


FIG. 53. STITCHING

A. The left-hand needle has been entered and the person stitching is about to grasp it with the thumb and first finger of his right hand to pull it thru

B. The left-hand needle is thru, the right-hand needle is entered, and the left-hand thread is pulled back to help the needle thru

FIG. 54. STITCHING IN A LOOP

A. The awl is entered at an angle, the point toward the person stitching. The awl does not pierce the leather forming the top of the loop
B. The awl is entered at an angle, the point away from the person stitching

strap and not pass between the ends. There would be a greater chance of this happening if the ends of the loop strap came together at the center rather than at one side of the long strap.

Place the work in a clamp and stitch toward the loop. When the loop is reached, enter the awl at an angle, with the end pointing away from the person stitching, and coming out between the strap and the top of the loop. The awl pierces all of the straps except the top of the loop (fig. 54, B). Make two or three stitches in this manner and then enter the awl at an angle, pointing toward the person stitching (fig. 54, A).

FIG. 55. CLEANING A HARNESS

Each part of the harness is scrubbed after it has soaked in warm water containing a little sal soda. A homemade scrubbing board is shown.

The awl must again pierce all of the straps except the top of the loop strap. Make two or three stitches and then finish the stitching and tie a knot.

OVERHAULING AND CLEANING A HARNESS

In order to do the work well it is best to take the harness apart and make such repairs as are necessary. Allow the harness to soak thoroly in a washtub three-fourths full of warm water containing a handful of sal soda. As each part is removed, scrub it well and put it aside (fig. 55). The work will be greatly facilitated if a scrubbing board is used. This allows the dirty water to drain back into the tub. While the harness is still wet, apply harness oil with a sponge or a cloth. Rub the oil well into the leather. As the water dries out of the leather the harness oil will work in. As the parts of the harness are oiled, place them in a pile so that the surplus oil may drip from the top pieces to the lower pieces, as shown in the cover cut. The condition of the harness will determine the number of coats needed. Use harness soap or dressing to finish the process.

MAKING A SIMPLE HARNESS CLAMP

Cut two pieces of board (fig. 56, A and B), and finish as shown in the drawing. Cut another piece $\frac{3}{4}$ inch by $\frac{3}{4}$ inch by 4 inches (fig. 56, C), beveling the lower edge slightly. Cut a piece of leather 4 inches by $2\frac{3}{4}$ inches (fig. 56, D). Nail piece "C" to piece "A" only. Nail the leather to pieces "A" and "B" only. To use the clamp, place the leather to be stitched between the jaws of the clamp, place the clamp in a vise, and tighten the vise (fig. 25). The jaws will be brought together and the leather held firmly.

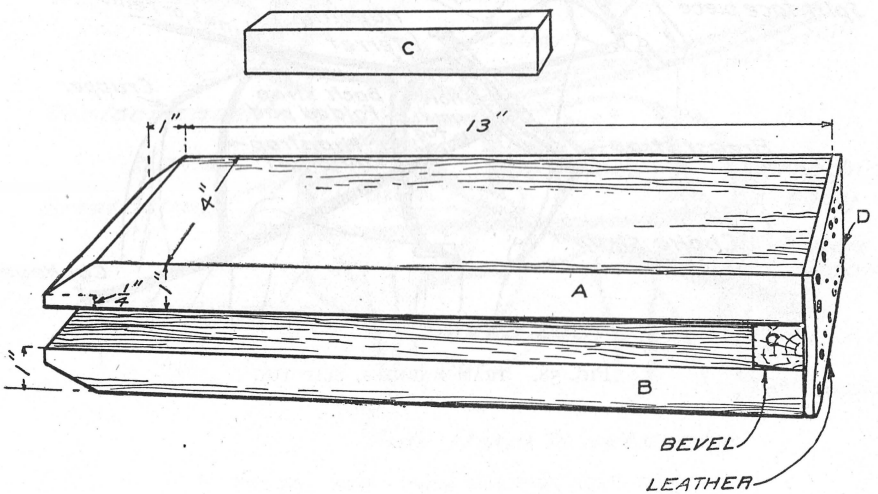


FIG. 56. A SIMPLE HARNESS CLAMP

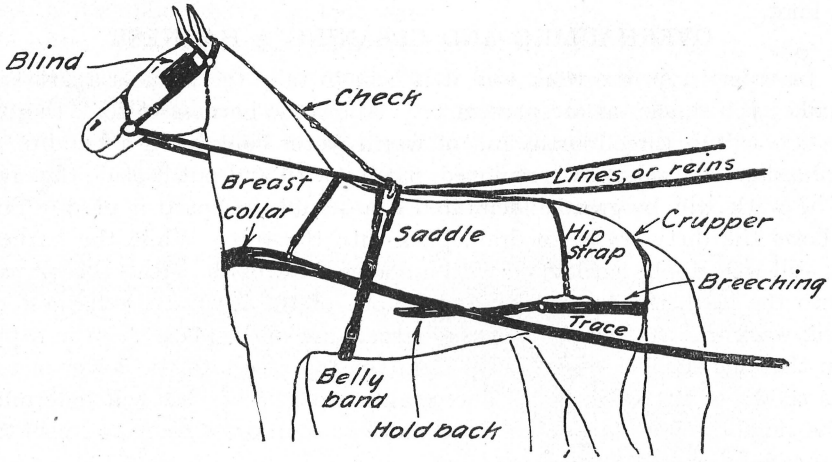


FIG. 57. SINGLE BUGGY HARNESS

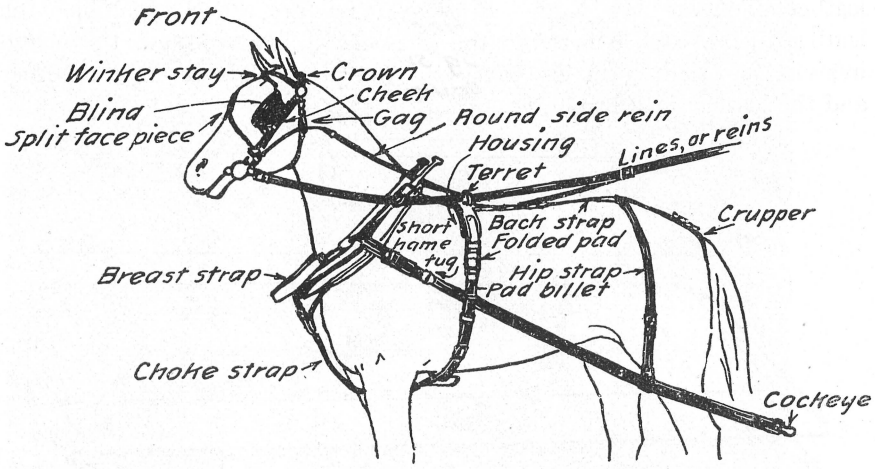


FIG. 58. TEAM HARNESS, SLIP TUG

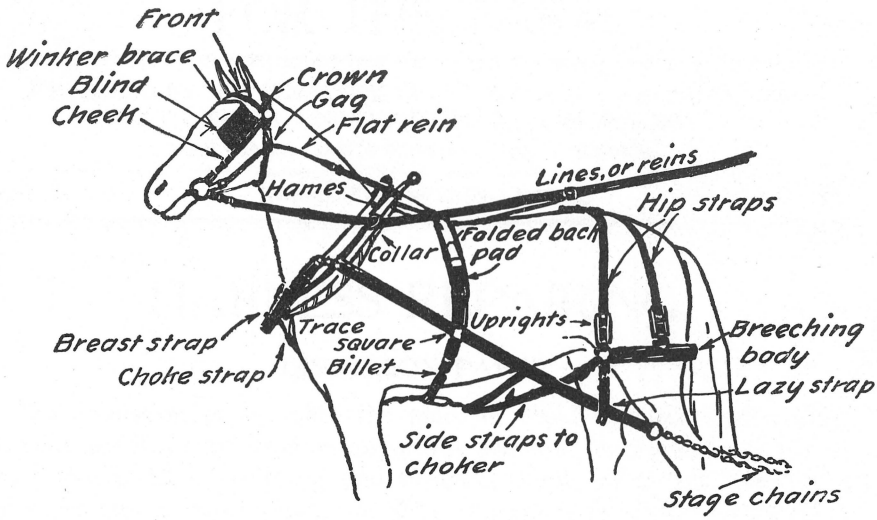


FIG. 59. TEAM HARNESS, SHORT TRACE

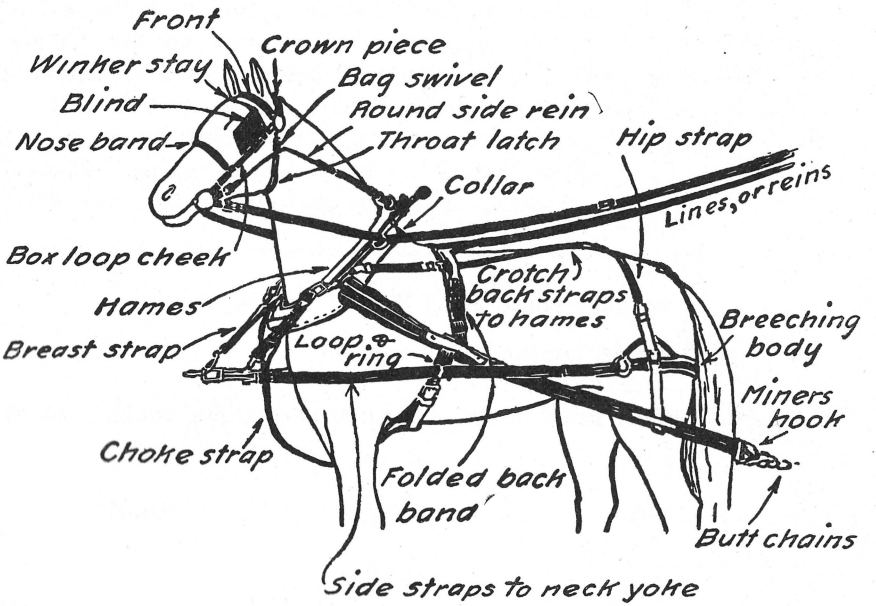


FIG. 60. HEAVY TEAM HARNESS, LONG TRACE

THE CORNELL READING COURSE FOR THE FARM

PUBLISHED BY THE NEW YORK STATE COLLEGE OF AGRICULTURE
AT CORNELL UNIVERSITY, ITHACA, NEW YORK
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LESSON 160 RURAL ENGINEERING SERIES AUGUST, 1921

HARNESS REPAIRING

DISCUSSION PAPER

The discussion paper takes the place of the teacher in encouraging thought and self-expression on important points in the lesson and aims to assist the reader in reviewing and applying them. It is NOT necessary to return this discussion paper in order to retain your name on the farm mailing list. If this bulletin comes to you, however, as a lesson in one of the Cornell Farm Study Courses, you must fill out and return this paper in order to receive the next lesson in the course for which you are enrolled.

If you are not now taking any of the farm study courses but would like to do so, you may receive full information concerning the courses offered, by filling out the blank below and returning it to the College. The farm study courses are arranged by the extension men of the departments represented and they include Cornell bulletins, Geneva bulletins, and farmers' bulletins of the United States Department of Agriculture. They are consecutive courses for home study in various phases of agriculture and are free to the residents of New York State. You may make inquiry on a postal card or by letter if you prefer.

Supervisor, Cornell Farm Study Courses,
College of Agriculture, Ithaca, New York.

Please send me information about the Cornell Farm Study Courses.

Name.....

Date.....Address.....

(In answering questions, attach additional paper if needed and number the answers.)

1. What harness repairs do you have to make most frequently?

2. What kinds of repair work seem most difficult?

3. Which of the kinds of harness repairing described in this lesson have you done?

4. Do you clean and oil your harness? How often?

5. Do you find that it pays tc clean and ɔil a harness?

6. Is there a harness repair shop near you? How far? If not, where do you have your work done?

7. Do you keep any of the harness repair parts listed in this lesson? Which ones?

Name.....

Address.....

Date.....

(Address all correspondence to Cornell Farm Study Courses, College of Agriculture, Ithaca, New York.)